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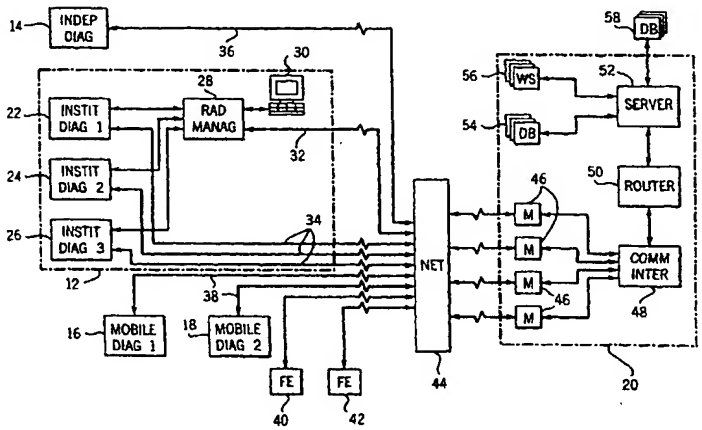
(54) Medical diagnostic system service connectivity method and apparatus

(57) A technique is provided for verifying network connectivity between a medical diagnostic system (12, 14, 16, 18, 22, 24 26) and a remote service facility (20). The remote service facility (20) is contactable at will by the subscribing system to request service, information, technical assistance, and so forth, while the service facility may also contact the subscribing system for acquisition of data, transmission of service messages, protocols, and so forth. In the connectivity verification sequence, a subscribing system (12, 14, 16, 18, 22, 24, 26) is selected by the service facility and a network connection (44) is established. A message is transmitted to the system provoking software at the system to re-establish the network connection from the system side. Two-way connectivity is thereby verified. Mobile systems (16, 18) may be configured to contact the service facility at their own initiation, and exchange data for permitting the service facility to re-contact the mobile system. Failure modes may be identified at various locations in the connectivity network by identification of steps in the connectivity verification process where the process failed. Alerts or other action items may be generated as a result of detected connectivity problems.

FIG. 1



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EUROPEAN SEARCH REPORT

Application Number
EP 00 30 7194

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 5 943 391 A (NORDLING KARL INGMAR) 24 August 1999 (1999-08-24) * column 1, line 34 - line 52 * * column 2, line 15 - line 42 * * column 3, line 14 - line 43 * * column 4, line 21 - line 50 * * column 4, line 60 - line 67 * * column 5, line 44 - column 6, line 63 * ---	1-10	G06F19/00
X	US 5 818 904 A (DEAN MATTHEW T) 6 October 1998 (1998-10-06) * column 2, line 45 - column 3, line 31 * * column 4, line 33 - column 5, line 29 * ---	1-10	
A	DE 37 23 115 C (TELENORMA TELEFONBAU UND NORMALZEIT GMBH, 6000 FRANKFURT, DE) 16 March 1989 (1989-03-16) * column 2, line 15 - column 3, line 56 * ---	1-10	
A	US 5 077 782 A (BUSHUE CARL J ET AL) 31 December 1991 (1991-12-31) * column 1, line 60 - column 2, line 49 * ---	1-10	TECHNICAL FIELDS SEARCHED (Int.Cl.7) G06F H04M H04L
A	US 5 796 953 A (ZEY DAVID A) 18 August 1998 (1998-08-18) * column 2, line 10 - line 44 * * column 3, line 21 - line 61 * * column 4, line 1 - line 62 * * column 5, line 17 - line 58 * --- -/--	1-10	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	8 August 2001	Barba, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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EPO FORM 1503 03.82 (P04C01)

NSDOCID: <EP 1081627A3 I >

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EUROPEAN SEARCH REPORT

Application Number
EP 00 30 7194

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	SOEHLKE K ET AL: "Interfacing a radiology information system and a picture archiving and communication system" IEEE PACIFIC RIM CONFERENCE ON COMMUNICATIONS, COMPUTERS AND SIGNAL PROCESSING (CAT. NO.91CH2954-6), VICTORIA, BC, CANADA, 9-10 MAY 1991, pages 729-732 vol.2, XP002174370 1991, New York, NY, USA, IEEE, USA ISBN: 0-87942-638-1 * page 730, right-hand column, line 48 - page 732, right-hand column, line 4 *	1-10	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 00 30 7194

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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08-08-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5943391 A	24-08-1999	AU 7954498 A WO 9857486 A	30-12-1998 17-12-1998
US 5818904 A	06-10-1998	DE 19744412 A GB 2320395 A,B	16-04-1998 17-06-1998
DE 3723115 C	16-03-1989	NONE	
US 5077782 A	31-12-1991	NONE	
US 5796953 A	18-08-1998	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2002/0099283 A1**

Christ et al. (43) **Pub. Date: Jul. 25, 2002**

(54) **MEDICAL SYSTEM FOR MONITORING A MEASURED VALUE OF A PATIENT RELATING TO BLOOD-CLOTTING**

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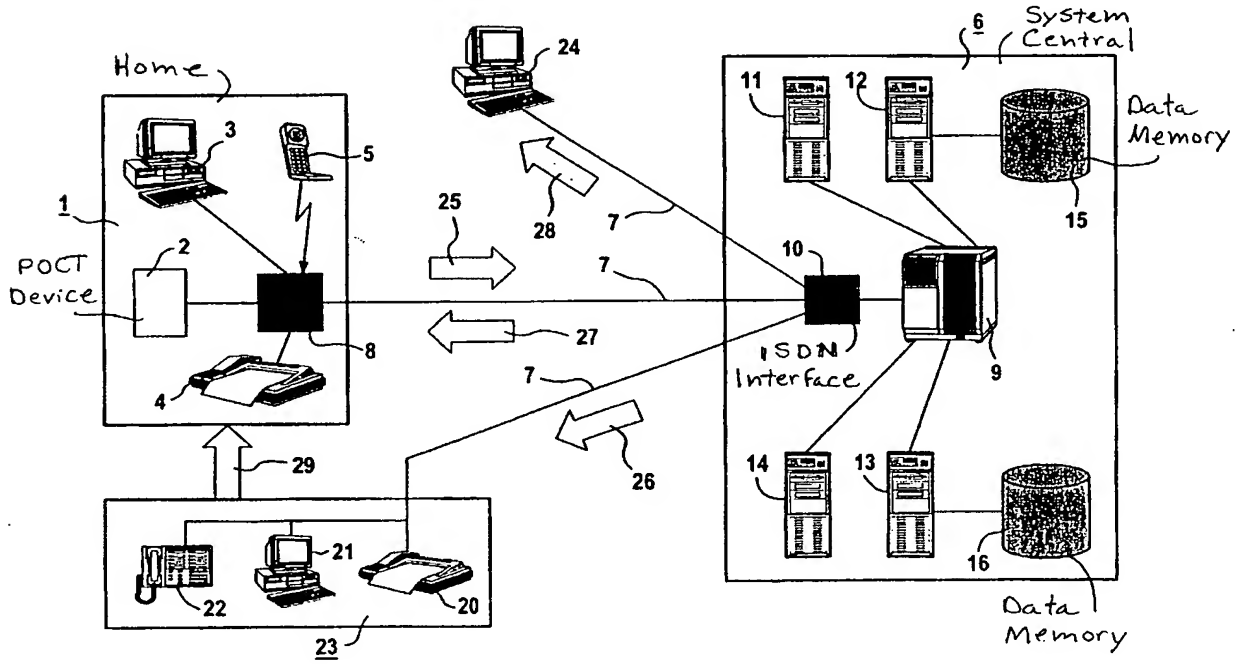
(57) **ABSTRACT**

A medical system for monitoring a measured value of a patient characterizing blood clotting and/or for setting a medication that influences blood clotting for a patient in a home environment, has a device for acquiring measured values of the patient relating to blood clotting, a device for transmitting the measured values to a system central, a device for interrogating the measured values, and a reception device at a monitoring person. The system central has a memory for the measured values, an analysis device for the measured values by comparing the measured values to stored reference values, an alarm generator which generates an alarm signal upon a recognition of predetermined conditions, and a routing device for forwarding the alarm signal to a reception device of a person to be alerted in a process chain.



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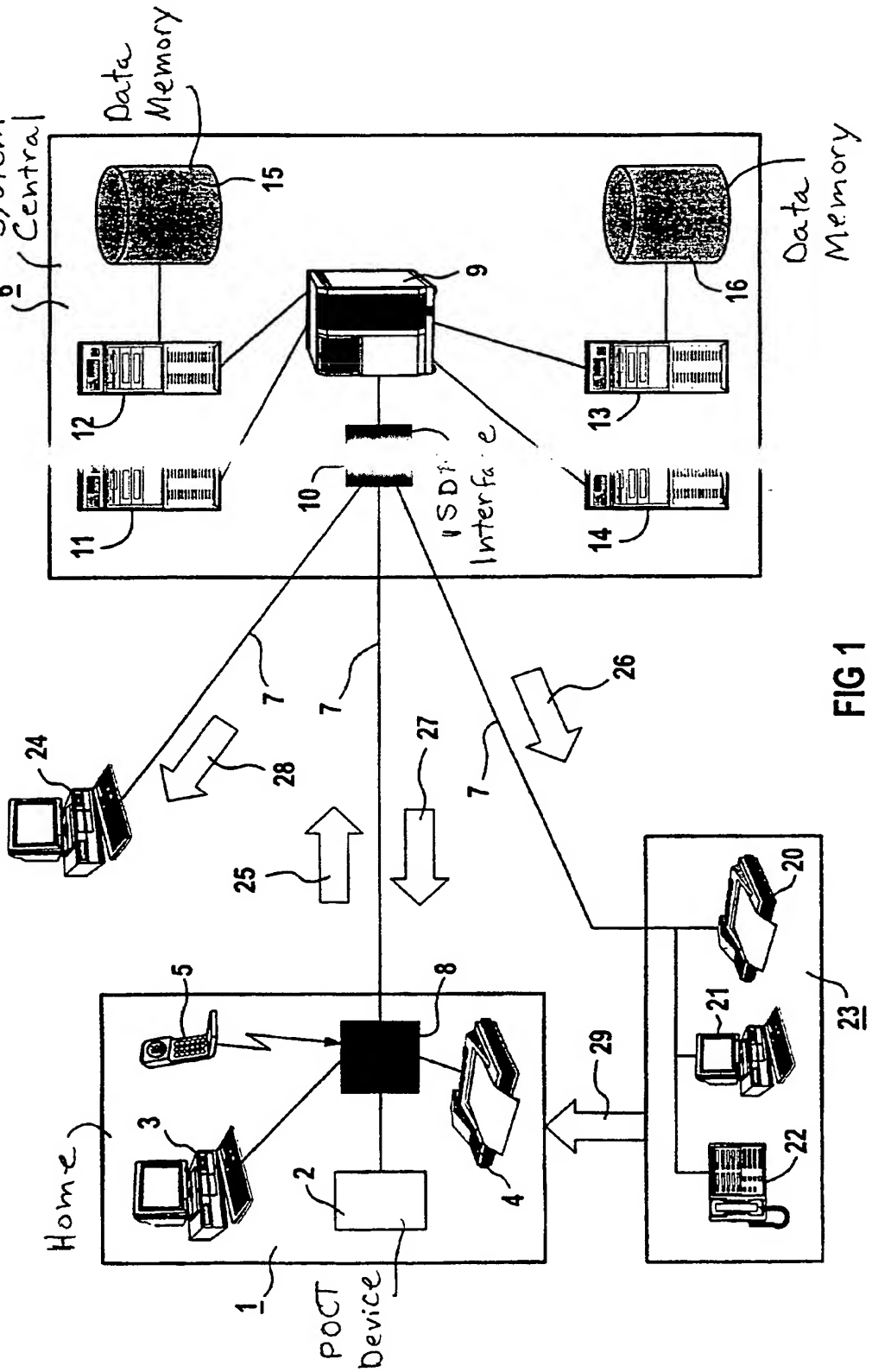
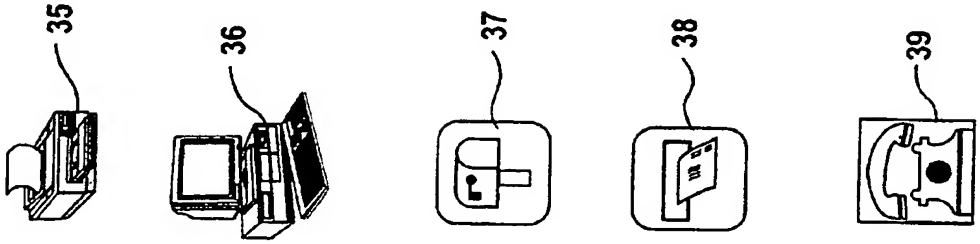

System Central
6
Data Memory
15
Data Memory
16
9
12
13
11
10
ISDN Interface
14
7
7
7
26
27
28
24
25
20
21
22
23
29
5
8
3
2
4
Home
1
POCT Device

FIG 1



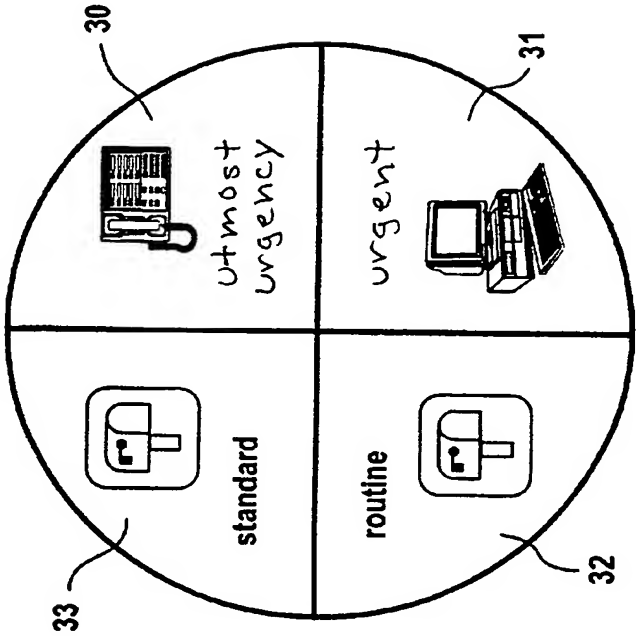
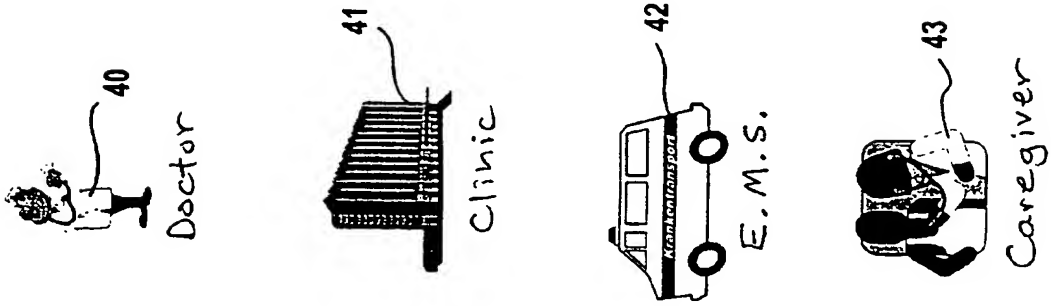


FIG 2



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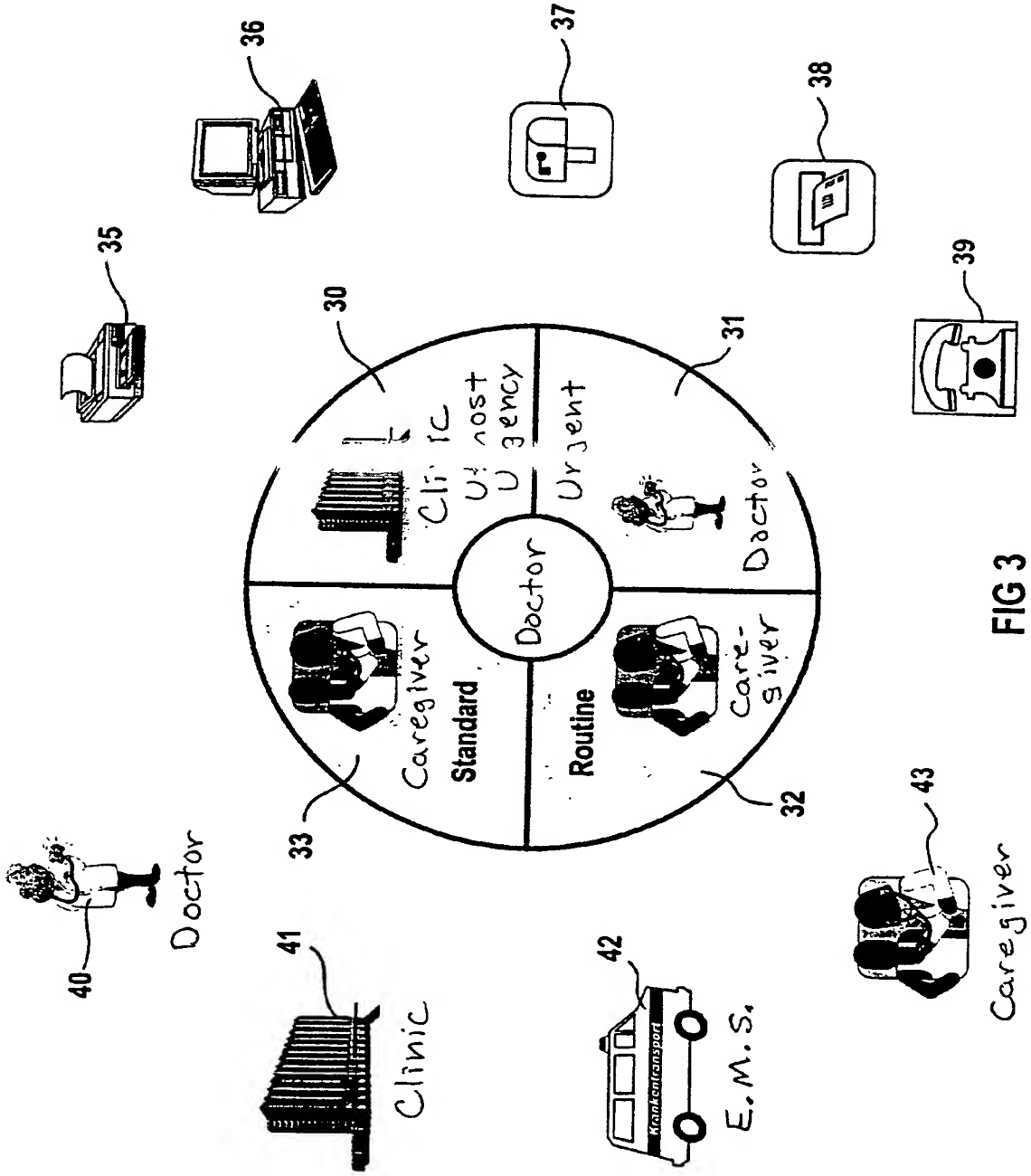
36
37
38
35
39
30
31
Clinic
Urgent
Doctor
Doctor
Caregiver
Standard
Routine
Care-giver
33
32
40
Doctor
41
Clinic
42
E.M.S.
43
Caregiver

FIG 3

MEDICAL SYSTEM FOR MONITORING A MEASURED VALUE OF A PATIENT RELATING TO BLOOD-CLOTTING

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention is directed to a medical system for monitoring a measured value of a patient characterizing blood clotting of the patient and/or for setting a medication that influences the blood clotting for a patient in a home environment.

[0003] 2. Description of the Prior Art

[0004] The frequency of cardiovascular conditions in the population is steadily increasing. When suffering from such conditions, for example cardiac infarctions, patients often must live with bypasses, artificial heart valves or artificial blood vessels. Accompanying this is the constant risk of recurrent thromboses, embolisms or disturbances of the heart rhythm, for example, for which patients usually must be treated life-long with medications that influence blood clotting, known as anticoagulants, such as Marcumar, Falithrom or Warfarin. This therapy is highly effective in and of itself but some physicians are wary about prescribing such medications because the medication level is relatively difficult to set. The effect of the medications is decisively dependent on the nutritional habits of the patient as well as on the taking of further medications. Whereas an overdosage creates the risk of life-threatening hemorrhages, for example renal hemorrhage or massive cerebral hemorrhage, thromboses, infarctions or strokes cannot be precluded in the case of an under-dosing.

[0005] The monitoring of a measured value of a patient characterizing blood clotting as well as the setting of a medication that influences blood clotting for a patient in an extra-clinical environment heretofore has been only inadequately addressed. There are known coagulation measuring instruments with which the patient can measure coagulation values at home, these values then being reported to the attending physician, for example on paper or as a telefax. However, close cooperation with a physician is required for an adequate treatment, particularly for monitoring the activity of the patient, during a readjustment or change of medications, the administration of additional medications or for acute emergency situations.

SUMMARY OF THE INVENTION

[0006] An object of the present invention is to provide a medical system of the type initially described wherein extra-clinical monitoring of a value of a patient characteristic for coagulation and/or an extra-clinical setting of a medication influencing coagulation for a patient can ensue a degree of medical care that is necessary for the good health of a patient.

[0007] According to the invention, this object is achieved in a medical system for monitoring a measured value of a patient characterizing blood clotting and/or for setting a medication that influences blood clotting for a patient in a home environment having a device for acquiring measured values of the patient relating to blood clotting, a device for the transmission of the measured values to a system central, having a device for interrogating the measured values and a reception device at a monitoring person. The system central has a memory for the measured values, an analysis device for the measured values for comparing the measured values to stored rated values, an alarm generator for generating an alarm signal and a routing device for forwarding the alarm signal to a person to be alerted in a process chain. With this system, the monitoring of measured values relating to the blood clotting of a patient can be segregated out of the clinical area or from a physician's practice and relocated into the living environment of the patient. In particular, the system monitors three quantities: the patient compliance, the measured values of the patient relating to the coagulation and the physician compliance. For a comprehensive medical care of the patient, alarms thus can be triggered if the patient does not generate and communicate measured values or does so too often, when the measured values lie in a health-jeopardizing range, so that an emergency situation is impending or has already occurred, and if the alerted location does not react adequately.

[0008] Immediate measures required in the event of sickness can be initiated without delay in an embodiment wherein the alarm generator is fashioned such that it generates an alarm signal given upward or downward transgression, particularly given a significant upward or downward transgression, of stored reference value limits by the measured values. The alarm signal is routed to a reception device or a person in a treatment chain or a person in an emergency chain.

[0009] In a version of the invention, the alarm generator can generate an alarm signal if measured values fail to arrive, this alarm signal being routed to a reception device of the patient, and/or it can generate an alarm signal given lack of a reaction of a person in the treatment chain to specifically identified measured values that have been routed to a reception device of the emergency chain.

[0010] It is advantageous for the routing device to route the alarm signal to a predetermined, selectable reception device of the process chain or to route the alarm signal automatically to a reception device of the process chain defined by the routing device, taking availability into consideration.

[0011] A fast and effective notification in case of emergency can be achieved in an embodiment wherein the routing device is a learning expert system that effects the alerting of the process chain, for example notification of the family physician, calling the emergency physician, organizing the transport service and/or preparing the clinic.

[0012] Undesired false alarms are reduced or precluded in an embodiment wherein the analysis device is a learning expert system that interprets the measured values disease-specifically and/or problem-specifically on the basis of rule systems or based on probabilities, as a result of which the alarm signal is triggered.

[0013] In a version of the invention provides that the alarm generator generates different alarm signals dependent on the urgency of a reaction to an event, these alarm signals being routed to reception devices of a treatment and/or emergency chain.

DESCRIPTION OF THE DRAWINGS

[0014] **FIG. 1** schematically illustrates an inventive medical system for monitoring a measured value of a patient

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characteristic of blood clotting and for setting a medication for a patient that influences blood clotting.

[0015] FIG. 2 illustrates a user interface for configuring a central alarm generator in accordance with the invention.

[0016] FIG. 3 illustrates a user interface for configuring the forwarding of alarms in accordance with the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] FIG. 1 shows an inventive system for monitoring measured values of a patient (not shown) relating to blood clotting and for setting a medication for the patient at home 1 that influences blood clotting. The acquisition of the measured values, which characterizes the blood clotting of the patient and includes information about the type, dose and taking of medications influencing the blood clotting as well as information about food consumed or color of urine, usually partly automatically by the patient or a care giver. A POCT device 2 (point of care testing), also called a coagulation monitor, is employed for this purpose. This device 2 makes it possible to identify coagulation values such as Quick or PTT of the patient and also makes it possible to undertake a self-test and a self-dosage of a medication, for example Warfarin. Such POCT devices are distributed, for example, by November AG under the name Novi Quick or by Roche under the name Coagucheck or Coagucheck Plus. The information relating to the eating habits and the color of urine, in contrast, can be acquired in a questionnaire.

[0018] The bundle 25 of measured values, preferably acquired at regular points in time, after corresponding input or measurement, can be communicated to a system center 6 directly from the device 2 or via a transmission device for information, for example by personal computer 3, by fax machine 4 or by telephone or cell phone 5, that is connected to the device 2. This can ensue via a communication network, for example via an ISDN network 7, to which the corresponding terminal devices are connected via an ISDN interface 8. Insofar as they are Internet-compatible, however, the terminal devices also can be connected to the Internet for the data transfer via a corresponding interface, the ISDN interface 8 also being suitable for this purpose.

[0019] The system center 6 serves the purpose of accepting and storing the measured values, and preferably further-processes the measured values and, when necessary, a triggers alarm signals.

[0020] To this end, a gateway 9 that is connected to the ISDN network 7 via an ISDN interface 10 is provided in the system center 6. An Internet proxy server 11 for access to the Internet, an analysis device 12 for the measured values, a patient data server 13 for administering the patient data and a communication server 14 operating as routing device for the collaboration of all components and for routing information, can be connected to the gateway 9. A data memory 15 for the measured values is connected to the analysis device 12 and a data bank 16 as memory device is connected to the patient data server 13.

[0021] The measured values are accepted in the system center 6 via the ISDN interface 10 and are stored long-term in the data memory 15. The analysis device 12 has a comparator for comparing the measured values to reference values stored in the data memory 15 and interprets the point in time of the transmission of the measured values. The analysis device 24 also has an alarm generator for generating messages and alarms given abnormal measured values, given the failure of measured values to arrive from the patient and given a lack of a reaction on the part of a physician or a patient to an alarm.

[0022] All information required for activating the alarm generator and for realizing a forwarding of alarms and messages given the absence of the intended recipient thus is merged in the system center 6.

[0023] Reception devices such as, for example, a fax machine 20, a personal computer 21, a telephone 22 or cell phone are connected to the system center 6. These can belong, for example, to a standby physician and, for example, are arranged in a cooperative practice 23 of physicians.

[0024] In the exemplary embodiment, further, a personal computer 24 of a practice of a primary physician is connected via the ISDN network 7 to the gateway 9 of the system center 6. An output of the measured values stored in the data memory 15 to one of the terminal devices for physicians ensues via the ISDN interface 10.

[0025] When the acquisition of the bundle 25 of measured values is carried out by a care giver, then a personal digital assistant (PDA) or a laptop is provided for this person, all patient data of patients visited by this care service are entered into that device. Synchronization of the data can ensue immediately, for example via a cell phone/Internet connection, or can ensue at a later point in time when the care giver returns to the office or to the practice.

[0026] As already indicated one or more alarms is triggered by the alarm generator of the analysis device 12, preferably given the presence of one of the event constellations such as the failure of measured values to arrive from a patient, the presence of abnormal measured values or the lack of a reaction on the part of the informed person to a generated alarm, either a physician or the patient himself. The analysis device 12 thereby determines whether measured values or measured value constellations are to be classified as a health risk. Limits from the literature or medication-specific limits are used as a criterion, these being stored in the data memory 15. Further, the attending physician can define individual limits for the patient.

[0027] An alarm 27 to the patient is triggered, for example, when measured values that have become due from the patient are not supplied. Further, an alarm 26 is routed to the terminal devices 20 through 22 of the cooperative practice 23 or to the primary physician due to transgression of a limit value, preferably a downward or upward transgression of reference value limits, by the measured values. In the practice, every treating physician who has authorization can fetch the measured values stored in the data memory 15 with a personal computer, a telephone, a fax, a cell phone or some other communication device.

[0028] An expert system that interprets the measured values in a manner disease-related to a pathology specifically and specifically related to a particular problem on the basis of rule systems or interprets the measured values based on probabilities can be used for reviewing the measured values and triggering alarms. A customization of the expert

system to the patient is thereby achieved, i.e. the expert system learns the patient, and the coagulation values of the patient and becomes more and more familiar with the physical values related thereto during the course of the monitoring process. As a learning system, it constantly makes predictions about future measured values to be anticipated and compares these to the actual measured values. An individualized monitoring is thus realized.

[0029] In the case of complex alarms, an expert system can be utilized that assumes tasks of the process chain such as reminding the patient, notifying the family physician, calling the emergency physician, organizing the transport service and/or readying the clinic, taking the availability of the alarm recipient into consideration.

[0030] The process chain thereby includes the totality of participating persons and institutions. These include the patient, the treatment chain with physician, care and transport service as well as the emergency chain with fire department router, emergency and transport services as well as the hospital.

[0031] Alarms can be generated with different urgency levels such as, for example, utmost urgency, urgent, routine or standard dependent on the urgency of a reaction of a notified person or institution. Which measured values lead to which urgency levels can be defined with the same mechanisms as the evaluation of the measured values and can be stored in the data memory **15**.

[0032] The user carries out the configuration of the central alarm generator of the cooperative practice **23**. The monitoring entity, such as one of the physicians, personally defines how he or she wishes to receive messages having different urgency. The user interface shown in **FIG. 2** is employed for this purpose. The communication circle is divided into segments **30** through **33** that represent the urgency levels of the alarm messages.

[0033] For configuration, the physician drags the device icons from the series of communication devices **35** through **39** of the user into the corresponding segments **30** through **33**, namely those communication devices via which the physician would like to be reached given the arrival of a classified message. The configuration is stored in the system center **6**.

[0034] Given the selected configuration according to **FIG. 2**, the physician is informed by telephone **22** in cases of utmost urgency, by e-mail via the personal computer **21** given urgent cases and by mail in all other instances.

[0035] If a physician does not react to an alarm within a reasonable time, the alarm generator of the analysis device **12** forwards the alarm to the system center **6**. The configuration regarding the person to whom the alarm signal should be routed is undertaken by the physician personally. To this end, the physician employs a communication circle shown in **FIG. 3** that is segmented on the basis of the urgency levels. The physician drags the respective icons representing physicians and/or institutions **40** through **43** that are to be alerted in an emergency when the physician himself does not react into the corresponding circle segments.

[0036] Given the selected configuration according to **FIG. 3**, a clinic **41** is notified given cases of utmost urgency, a different, selected physician **40** is notified given urgent cases, and the care service is notified in all other cases.

[0037] Alternatively, the alerting of the physician and the forwarding, if necessary, ensue in a single communication circle.

[0038] Default settings can be prescribed by the server, so that the physician is presented with a meaningful proposal given an initial installation, with a preference list of the physician being taken into consideration.

[0039] Further, alarms with different complexity can be generated. In the simplest case, only the physician or the physician's representative are informed. The alarms, however, can be forwarded pathology-specifically to different locations. Thus, the alarms relating to the medication setting can be forwarded to an attending specialist and acute emergencies as a result of coagulation values deviating greatly from the norm can be forwarded to a clinical establishment. The alarms initiate measures that are additionally required. For example, they alert the attending physician when internal hemorrhaging is suspected and simultaneously alert the Emergency Response routing center and the transport service of the emergency chain.

[0040] The information channel to the patient also can be configured so that the patient also can receive messages from the physician. To that end, the patient can likewise configure a communication circle into which the patient enters the paths by which the patient can be reached.

[0041] Alternatively, the patient can set a forwarding of urgent messages when on vacation or when in the hospital.

[0042] The sending of information occurs such that the analysis device **12** generates a message and forwards it to the communication server **14** for the sending of the message. The communication server **14**, as a routing device, sends messages to a recipient using a telephone book sub-routine wherein contact information about an addressable recipient are offered.

[0043] The physicians' terminal device serve the purpose of reproducing and presenting the measured values as well as the parameterization of the alarm generator, the communication paths for sending messages and the terminal devices for patient and/or care giver.

[0044] An alarm audio devices emits the messages sent by the message transmission at the recipient. Specific embodiment of the terminal devices for patient and/or care givers can serve this purpose, for instance a PDA with modem, a telephone with voice or dual tone multi-frequency signaling (DTMF), a measuring instrument with integrated modem, a TV set-top box, a cell phone, a WWW form, or a paper form and a WWW form.

[0045] The system center **6** has an interface for coupling to a quality assurance system in order to obtain a result quality under real conditions. Further, the central system **6** can comprise an interface for coupling to an accounting module.

[0046] In various embodiments the alarm generator can trigger an alarm given incorrectly acquired measured values, trigger an alarm given compliance problems on the part of the patient, trigger an alarm when the reaction time of the

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physician to urgent messages is too long, and forward an alarm if the physician does not react.

[0047] Messages can, for example, be communicated via voice by telephone, or by SMS, e-mail, WWW, WAP, telefax, proprietary service or letter mail.

[0048] The analysis device **12** for the measured values and the patient data server **13** can be implemented for data collecting such that the measured values are stored dependably and in pseudonym form.

[0049] The terminal devices for physicians preferably include a graphic user interface based on Internet technologies. For parameterizing the alarm generator, the device offers the method visualized in **FIG. 2**. The method illustrated on the basis of **FIG. 3** serves the purpose of parameterizing the notification paths.

[0050] Dependent on the alarm level, the alarm terminal device can, for example, be a telephone, cell phone, e-mail terminal, WWW terminal, fax machine, a terminal for using a proprietary service or a conventional postal service mailbox.

[0051] The alarm terminal device in the cooperative practice **23** can have a return channel **29** for transmitting therapy instructions to the patient and/or care giver, so that a therapy can be implemented despite the spatial separation between physician and patient (tele-therapy).

[0052] The inventive system creates a "virtual" care station at the patient's home that includes a central alarm generator system that generates alarms given:

[0053] Faulty patient compliance (anticipated measured values of the patient fail to arrive)

[0054] Upper transgression of thresholds (i.e. the measured values lies in an abnormal range).

[0055] Faulty physician compliance (anticipated reaction to the alarm on the part of the physician fails to occur).

[0056] The inventive configuration capability for contacting and alarm forwarding allows customized settings according to the current requirements of each treatment case.

[0057] Back-up procedures ensure a forwarding given the lack of a reaction on the part of a physician.

[0058] Disease-specific alarm forwardings can be set.

[0059] A treatment chain such as emergency physician, transport, clinic, care service and/or Reha can be notified and coordinates.

[0060] A customized configuration of the data communication of physician and/or care giver to the patient can be selected by the patient.

[0061] Although modifications and changes may be suggested by those skilled in the art, it is the intention of the inventors to embody within the patent warranted hereon all changes and modifications as reasonably and properly come within the scope of their contribution to the art.

We claim as our invention:

1. A medical system for monitoring a measured value of a patient in a home environment, characterizing blood clotting of said patient, comprising:

a measured value acquisition device adapted for interaction with a patient to acquire measured values relating to blood clotting of said patient;

a transmission device connected to said measured value acquisition device for transmitting said measured values to a system central;

said system central having a memory at which reference values are stored, and an analysis device, supplied with said measured values and having access to said memory, for comparing the measured values to said reference values, and an alarm generator which generates an alarm signal dependent on a relationship of said measured values to said reference values;

a plurality of reception devices located remote from said system central, and respectively associated with different persons in a response chain; and

a routing device supplied with said alarm signal, and said routing device routing said alarm signal to at least one of said reception devices.

2. A medical system as claimed in claim I wherein said memory at said system central contains stored reference value limits associated with said reference values, and wherein said alarm generator generates said alarm signal given upward or downward transgression of said stored reference value limits by said measured values, and wherein said routing device routes said alarm signal to a reception device, among said plurality of reception devices, associated with a person responsible for treatment of said patient.

3. A medical system as claimed in claim 1 wherein said memory at said system central contains stored reference value limits, associated with said reference values, and wherein said alarm generator generates said alarm signal given significant upward or downward transgression of said reference value limits by said measured values, and wherein said routing device routes said alarm signal to a reception device, among said plurality of reception devices, associated with an emergency response person.

4. A medical system as claimed in claim 1 wherein said alarm generator generates said alarm signal given failure of said measured values to arrive at said system central, and wherein said routing device routes said alarm signal to a reception device, among said plurality of reception devices, associated with said patient.

5. A medical system as claimed in claim 1 wherein said analysis unit generates an analysis result dependent on the comparison of said measured values to said reference values, and wherein said routing unit routes said analysis result to a reception device, among said plurality of reception devices, associated with a person responsible for treatment of said patient, and wherein said alarm generator generates said alarm signal given a lack of reaction of said person responsible for treatment of said patient, and wherein said routing unit routes said alarm signal to a further reception device, among said plurality of reception devices, associated with an Emergency Response person.

6. A medical system as claimed in claim 1 wherein said alarm generator generates said alarm signal with routing information contained therein, and wherein said routing device routes said alarm signal to one of said plurality of reception devices designated by said routing information.

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7. A medical system as claimed in claim 1 wherein said routing device automatically routes said alarm signal to one of said reception devices defined by said routing device dependent on availability.

8. A medical system as claimed in claim 1 wherein said routing device is a learning expert system.

9. A medical system as claimed in claim 1 wherein said analysis device comprises a learning expert system that interprets said measured values in a pathology specific manner using an analysis basis selected from the group consisting of rule systems and probabilities.

10. A medical system as claimed in claim 1 wherein said analysis device comprises a learning expert system that interprets said measured values in a problem specific manner using an analysis basis selected from the group consisting of rule systems and probabilities.

11. A medical system as claimed in claim 1 wherein said analysis device comprises a learning expert system that interprets said measured values in a pathology specific and a problem specific manner using an analysis basis selected from the group consisting of rule systems and probabilities.

12. A medical system as claimed in claim 1 wherein said alarm generator generates different alarm signals dependent on an urgency identified by said analysis device, and wherein said routing device routes said alarm signals respectively to different reception devices among said plurality of reception devices dependent on said urgency.

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